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Title: METHOD FOR DAMPING NOISE, VIBRATION AND HARSHNESS OF A SUBSTRATE

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PATENT
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In The Claims

1. (Currently Amended) A method for damping vibration of a substrate comprising the steps of:

providing a substrate wherein the substrate is at least one of a body in white, carbon graphite composites, fiberglass, polycarbonates, ABS, or structural polymeric materials;

mixing at least two components to form a liquid material, wherein the first component consists essentially of at least one amine-terminated polymer having an average molecular weight greater than about 1500 and an amine equivalent weight greater than about 750, the polymer present in an amount sufficient to impart a predetermined amount of tensile strength, hardness and flexibility, and the second component consists essentially of at least one isocyanate compound, the first and second components reacting upon mixing to form a polyurea; and

applying the liquid material to the substrate at ambient temperature;

wherein the application occurs in a manner which produces ~~a tight, well-defined~~ an application pattern, the liquid material curing substantially instantaneously upon application and adhering to the substrate in a manner which attenuates vibration, noise and harshness transmitted through the substrate.

2. (Previously Presented) The method as defined in claim 1 wherein the ambient temperature ranges between about 35° F (1.7°C) and about 160°F (71.1°C).

3. (Previously Presented) The method as defined in claim 2 wherein the ambient temperature ranges between about 50°F (10°C) and about 120°F (48.9°C).

4. (Previously Presented) The method as defined in claim 1 wherein the substrate is applied at an ambient pressure ranging between about 730 mm Hg and about 800 mm Hg.

5. (Previously Presented) The method as defined in claim 4 wherein the substrate is applied at an ambient pressure ranging between about 750 mm Hg and about 780 mm Hg.

6. (Original) The method as defined in claim 1 wherein the material cures in an interval ranging between about 2 seconds and about 30 minutes.

7. (Original) The method as defined in claim 6 wherein the material cures in an interval ranging between about 15 seconds and about 20 seconds.

Please cancel claim 8 without prejudice.

8. (Canceled)

9. (Currently Amended) The method as defined in claim ~~8~~ 1 wherein the substrate is a body in white.

10. (Original) The method as defined in claim 1 wherein the applying step is performed by at least one of spraying, dipping and brushing.

11. (Original) The method as defined in claim 10 wherein the applying step is performed by a high pressure, impingement mix spray system.

12. Cancelled.

13. (Currently Amended) A method for damping vibration of a substrate comprising the steps of:

providing a substrate, wherein the substrate is at least one of a body in white, carbon graphite composites, fiberglass, polycarbonates, ABS, or structural polymeric materials;

mixing at least two components to form a liquid material, wherein the first component consists essentially of at least one polyoxylene polymer present in an amount sufficient to impart a predetermined amount of tensile strength, hardness and flexibility, and the second component consists essentially of at least one isocyanate compound, the first and second components reacting upon mixing to form a polyurea; and

applying the liquid material to the substrate at ambient temperature;

wherein the application occurs in a manner which produces ~~a tight, well-defined~~ an application pattern, the cured material adhering to the substrate in a manner which attenuates vibration, noise and harshness transmitted through the substrate.

14. (Original) The method as defined in claim 13, wherein the first component further consists essentially of:

at least one chain extender present in an amount sufficient to impart a predetermined amount of tensile strength, weatherability, flexibility, adhesion to specific substrates, and hardness; and

at least one filler present in an amount sufficient to impart a predetermined amount of harshness, flexibility, and specific vibration blocking characteristics to the substrate.

15. (Original) The method as defined in claim 14 wherein the first component further consists essentially of:

a colorant compound selected from the group consisting of carbon black, titanium dioxide, iron oxide, organic pigments, dyes, and mixtures thereof; and a catalyst selected from the group consisting of tertiary amines, organometallic catalysts, and mixtures thereof.

16. (Original) The method as defined in claim 13 wherein the at least one polyoxalene polymer is selected from the group consisting of polyoxypropylene diols, polyoxypropylene triols, di-, tri-, quad- or penta-functional polyester polyols, di-, tri-, quad- or penta-functional polyether polyols, and mixtures thereof.

17. (Currently Amended) The method as defined in claim ~~13~~ <u>16</u> wherein the isocyanate compound consists essentially of isocyanate quasi-prepolymers based on a uretonimine modified MDI and a high molecular weight polyether polyol having an isocyanate content of about 15.8% and a 2,4'-isomer content of less than about 10%.

18. (Original) The method as defined in claim 13 wherein the second component further consists essentially of at least one plasticizer present in an amount sufficient to impart a predetermined amount of flexibility.

19. (Original) The method as defined in claim 18 wherein the plasticizer consists essentially of alkylene carbonates selected from the group consisting of ethylene

carbonates, propylene carbonates, butylene carbonates, dimethyl carbonates, and mixtures thereof.

20. (Currently Amended) A method for damping vibration of a substrate comprising the steps of:

providing a substrate, wherein the substrate is at least one of a body in white, carbon graphite composites, fiberglass, polycarbonates, ABS, or structural polymeric materials;

mixing at least two components to form a liquid material, the first and second components reacting upon mixing;

wherein the first component consists essentially of at least one amine terminated polyoxylene polymer present in an amount sufficient to impart a predetermined amount of tensile strength, hardness and flexibility, and the second component consists essentially of at least one isocyanate compound having at least one-NCO radical reactive with the first component to form a polyurea compound; and

applying the liquid material to the substrate at ambient temperature, the liquid material ~~cures~~ curing substantially instantaneously;

wherein the application occurs in a manner which produces ~~a tight, well-defined~~ an application pattern, the cured material adhering to the substrate in a manner which attenuates vibration, noise and harshness transmitted through the substrate.

21. (Currently Amended) The method as defined in claim 20 wherein the further consists essentially of:

at least one chain extender selected from the group consisting of dialkyl substituted methylene dianilines, diethyltoluene diamines, and mixtures thereof; and

at least one filler is selected from the group consisting of barium sulfate, calcium carbonate, clay, ~~talc~~, aluminum silicate, titanium dioxide, nitrile rubbers, butyl rubbers, synthetic rubbers, chopped fiberglass, calcium metasilicate, fibers, fumed silica, and mixtures thereof.

22. (Original) The method as defined in claim 20 wherein the amine terminated polyoxalene polymer has a molecular weight between about 1000 and about 6000.

23. (Currently Amended) The method as defined in claim ~~20~~ 22 wherein the first component of the composition further consists essentially of at least one adhesion promoter, wherein the adhesion promoter comprises an organosilane compound.

24. (Currently Amended) A method for damping vibration of a substrate, the substrate being at least one of ~~a metal stamping,~~ a body in white, carbon graphite composites,

fiberglass, polycarbonates, ABS, and structural polymeric materials, the method comprising the step of:

applying substantially organic a liquid material by at least one of spraying, dipping and brushing onto the substrate in an ambient environment, the ambient environment having a temperature ranging between about 35°F (1.7°C) and about 160°F (71.1°C), wherein, after application to the substrate, the material cures in an interval ranging between about 15 seconds and about 20 seconds;

wherein the substantially organic liquid material consists essentially of:

a first component, consisting essentially of at least one polymer present in an amount sufficient to impart a predetermined amount of tensile strength, hardness and flexibility; and

a second component, consisting essentially of at least one isocyanate compound and is reactive with the first component;

wherein the application occurs in a manner which produces ~~a tight, well defined~~ an application pattern, the cured material adhering to the substrate in a manner which attenuates vibration, noise and harshness transmitted through the substrate.

25. (Original) The method as defined in claim 24 wherein the first component of the liquid material consists essentially of:

at least one polymer present in an amount sufficient to impart a predetermined amount of tensile strength, hardness and flexibility;

at least one chain extender present in an amount sufficient to impart a predetermined amount of tensile strength, weatherability, flexibility, adhesion to specific substrates, and harness; and

at least one filler present in an amount sufficient to impart a predetermined amount of hardness, flexibility, and specific vibration blocking characteristics to the substrate.

26. (Original) The method as defined in claim 25 wherein the at least one polymer is selected from the group consisting of polyoxypropylene diols, polyoxypropylene triols, di-, tri-, quad- or penta-functional polyester polyols, di-, tri-, quad- or penta-functional polyether polyols, and mixtures thereof.

27. (Original) The method as defined in claim 26 wherein the isocyanate compound consists essentially of isocyanate quasi-prepolymers based on a uretonimine modified MDI and a high molecular weight polyether polyol having an isocyanate content of about 15.8% and a 2,4'-isomer content of less than about 10%.

28. (Original) The method as defined in claim 27 wherein the second component further consists essentially of at least one plasticizer present in an amount sufficient to impart a predetermined amount of flexibility.

29. (Original) The method as defined in claim 28 wherein the plasticizer consists essentially of alkylene carbonates selected from the group consisting of ethylene carbonates, propylene carbonates, butylene carbonates, dimethyl carbonates, and mixtures thereof.

30. (Currently Amended) The method as defined in claim 25 wherein the at least one polymer comprises amine-terminated polyoxypropylene diols of about 2000 molecular weight;

wherein the at least one chain extender is selected from the group consisting of dialkyl substituted methylene dianilines, diethyltoluene diamines, and mixtures thereof; and

wherein the at least one filler is selected from the group consisting of barium sulfate, calcium carbonate, clay, ~~talc,~~ aluminum silicate, titanium dioxide, nitrile rubbers, butyl rubbers, synthetic rubbers, chopped fiberglass, calcium metasilicate, fibers, fumed silica, and mixtures thereof.

31. (Original) The method as defined in claim 30 wherein the first component further consists essentially of:

a colorant compound selected from the group consisting of carbon black, titanium dioxide, iron oxide, organic pigments, dyes, and mixtures thereof, and

a catalyst selected from the group consisting of tertiary amines, organometallic catalysts, and mixtures thereof.

32. (Previously Presented) The method as defined in claim 31 wherein the first component of the composition further consists essentially of at least one adhesion promoter, wherein the adhesion promoter comprises epoxy silane compounds.

33. (Currently Amended) A method for attenuating vibration transmitted through a passenger vehicle to the interior passenger cabin thereof, the method comprising the steps of:

~~Providing~~ providing at least one body component of an automotive passenger vehicle;

providing a substantially organic material consisting essentially of a liquid mixture of a first component and a second component, wherein the first component consists essentially of at least one polymer present in an amount sufficient to impart tensile strength, hardness and flexibility, and wherein the second component consists essentially of at least one isocyanate compound that is reactive with the first component, and wherein further the substantially organic material cures substantially instantaneously following application to the at least one body component; and

applying the liquid mixture of the substantially organic material to the at least one body component in a manner sufficient so that, upon curing thereof, the substantially organic material attenuates vibration of the at least one body component.

34. (Currently Amended) The method of claim 33, wherein the substantially organic material comprises a polyurea compound consisting essentially of at least one amine-terminated polymer having an average molecular weight greater than about 1500 and an amine equivalent weight greater than about 750, and at least one isocyanate compound, wherein the polyurea compound consists of at least one polyoxylene polymer and at least one isocyanate compound.

35. (Currently Amended) The method of claim 34, wherein ~~the polyurea compound consists essentially of at least one polyoxylene polymer and at least one isocyanate compound~~ the body component of the automotive passenger vehicle being at least one of a metal stamping, a body in white, carbon graphite composites, fiberglass, polycarbonates, ABS, or structural polymeric materials.

36. (Previously Presented) The method of claim 35, wherein the at least one polyoxalene polymer is selected from the group consisting of polyoxypropylene diols, polyoxypropylene triols, di-, tri-, quad- or penta-functional polyester polyols, di-, tri-, quad- or penta-functional polyether polyols, and mixtures thereof.

37. (Previously Presented) The method of claim 33, wherein the step of applying the substantially organic material to the at least one body component occurs at a temperature in the range of between about 35º F and about 160º F.

38. (Previously Presented) The method of claim 33, wherein the step of applying the substantially organic material to the at least one body component occurs at a temperature in the range of between about 50º F and about 120º F.

39. (Previously Presented) The method of claim 33, wherein the step of applying the substantially organic material to the at least one body component occurs at a pressure in the range of between about 730 mm Hg and about 800 mm Hg.

40. (Previously Presented) The method of claim 33, wherein the step of applying the substantially organic material to the at least one body component occurs at a pressure in the range of between about 750 mm Hg and about 780 mm Hg.

41. (Previously Presented) The method of claim 33, wherein the first component further consists essentially of at least one chain extender present in an amount sufficient to impart tensile strength, weatherability, flexibility, adhesion to a specific body component, and hardness.

42. (Previously Presented) The method of claim 33, wherein the first component further consists essentially of at least one filler present in an amount sufficient to impart hardness, flexibility, and specific vibration attenuating characteristics.

43. (Previously Presented) The method of claim 33, wherein the first component further consists essentially of at least one colorant compound selected from the group consisting of carbon black, titanium dioxide, iron oxide, organic pigments, dyes, and mixtures thereof.

44. (Previously Presented) The method of claim 33, wherein the first component further consists essentially of at least one catalyst selected from the group consisting of tertiary amines, organometallic catalysts, and mixtures thereof.

45. (Previously Presented) The method of claim 33, wherein the first component further consists essentially of at least one adhesion promoter comprising an organisilane compound.

46. (Previously Presented) The method of claim 33, wherein the second component further consists essentially of at least one plasticizer present in an amount sufficient to impart flexibility, the at least one plasticizer consisting essentially of alkylene carbonates selected from the group consisting of ethylene carbonates, propylene carbonates, butylenes carbonates, dimethyl carbonates, and mixtures thereof.

47. (Previously Presented) The method of claim 33, wherein the at least one isocyanate compound consists essentially of isocyanate quasi-prepolymers based on a uretonimine modified MDI, and a high molecular weight polyether polyol having an isocyanate content of about 15.8% and a 2,4'-isomer content of less than about 10%.